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Remedial Action Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13



Idaho National Engineering and Environmental Laboratory

**DOE/NE-ID-11137
Revision 1
Project No. 23364**

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Facilities Area, Operable Unit 4-13**

September 2004

**Prepared for the
U.S. Department of Energy
Idaho Operations Office**

ABSTRACT

This report describes the remedial action for the Waste Area Group 4, Operable Unit 4-13 Central Facilities Area-04 Pond Mercury Contaminated Soils. The following remedial action objectives were implemented to protect human health and the environment for contaminated soil sites:

- Prevent ingestion and inhalation of nonradionuclide contaminants of concern that would result in a total hazard index greater than 1.0.
- Prevent exposure of ecological receptors to contaminated soil with concentrations that result in a hazard quotient greater than or equal to 10.
- A final remedial action goal for mercury at the Central Facilities Area-04 pond site was established at 8.4 mg/kg, which was raised from the initial value of 0.5 mg/kg.

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ACRONYMS

BBWI	Bechtel BWXT Idaho, LLC
CEL	Chemical Engineering Laboratory
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
DEQ	Idaho Department of Environmental Quality
DOE-ID	U.S. Department of Energy Idaho Operations Office (old designation, now DOE Idaho)
EPA	U.S. Environmental Protection Agency
FRG	final remediation goal
HASP	Health and Safety Plan
ICDF	INEEL CERCLA Disposal Facility
INEEL	Idaho National Engineering and Environmental Laboratory
MCP	management control procedure
O&M	operations and maintenance
OU	operable unit
PACE	Paper, Allied-Industrial, Chemical and Energy Workers (Local 8-0652)
RA	remedial action
RAO	remedial action objective
RD/RA	remedial design/remedial action
ROD	Record of Decision
TCLP	toxicity characteristic leaching procedure
USC	United States Code
WAG	waste area group

Remedial Action Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13

1. INTRODUCTION

In accordance with the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991) (FFA/CO), the U.S. Department of Energy Idaho Operations Office submits this *Remedial Action Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, CFA-04 Pond Mercury Contaminated Soils Operable Unit 4-13* (DOE/NE-ID-11137, referred to as the Remedial Action Report), among the U.S. Department of Energy Idaho Operations Office (DOE Idaho), the U.S. Environmental Protection Agency (EPA), and the Idaho Department of Environmental Quality (DEQ), hereafter referred to as the Agencies. This Report finalizes the remedial action of Operable Unit (OU) 4-13, which includes remediation of sites Central Facilities Area (CFA)-04, -08, -09, and -10.

This OU 4-13 Remedial Action Report (an FFA/CO primary document) includes the description of the CFA-04 remedial action in the main body of the report. The description of the CFA-08 and CFA-10 remedial actions are included as attachments in Appendix A. The remedial actions were documented in “Construction Complete” reports that were previously reviewed and approved by the Agencies (DOE-ID 2002a, 2003a).

This report describes the work performed at the CFA-04 mercury pond, discusses any modifications to the remedial design, and documents the final status of the remedial action.

1.1 Organization of the Remedial Action Report

This Remedial Action Report (DOE/NE-ID-11137) describes the activities associated with the WAG 4 remedial action for the CFA-04 pond mercury contaminated soils. Following are brief descriptions of the Remedial Action Report’s sections and appendices.

- Section 1 describes the background and history of WAG 4 and provides an overview of the selected remedies for the areas of concern.
- Section 2 summarizes remedial action activities.
- Section 3 outlines the costs incurred during remedial action.
- Section 4 describes the modifications to the Remedial Design/Remedial Action (RD/RA) Work Plan (DOE-ID 2003b).
- Section 5 describes the waste streams generated during the remedial action.
- Section 6 addresses the prefinal and final inspection checklists.
- Section 7 includes the summary and verification of the work performed.

- Section 8 provides certification that the remedial action functions as designed and meets the remedial action goals and objectives.
- Section 9 lists the references.
- Appendix A comprises two reports as attachments to serve as a compilation of remedial action information.
- Appendix B contains the following:
 - Prefinal inspection checklist
 - INEEL Waste Determination and Disposition Forms
 - A summary of the CFA-04 prefinal inspection
 - Responses to EPA/DEQ requests for information during the prefinal inspection
 - Pictures of the Sample Point 6-3 excavation.
- Appendix C contains a report of preremediation sampling results of the CFA-04 mercury pond conducted in 2002.
- Appendix D contains a report of remedial action sampling results of the CFA-04 mercury pond.
- Appendix E provides a photographic record of CFA-04 mercury pond work.
- Appendix F provides an assessment of on-basalt remedial action sampling results of the CFA-04 mercury pond.
- Appendix G provides final topographic drawings of the CFA-04 mercury pond.

1.2 Background

Located 51 km (32 mi) west of Idaho Falls, Idaho, the INEEL is a government-owned, contractor-operated facility managed by DOE Idaho (Figure 1). Occupying 2,305 km² (890 mi²) of the northeastern portion of the eastern Snake River Plain, the INEEL encompasses portions of five Idaho counties: (1) Butte, (2) Jefferson, (3) Bonneville, (4) Clark, and (5) Bingham.

The Central Facilities Area is located in the south-central portion of the INEEL and has been used since 1949 to house many support services for all operations at the INEEL, including administrative offices, research laboratories, a cafeteria, emergency and medical services, construction and support services, workshops, warehouses, vehicle and equipment pools, a bus system, and laundry facilities. The types of “Comprehensive Environmental Response, Compensation, and Liability Act” (CERCLA) (42 USC 9601 et seq.) remedial sites at CFA include landfills, underground storage tanks, aboveground storage tanks, drywells, disposal ponds, soil contamination areas, and a sewage plant.

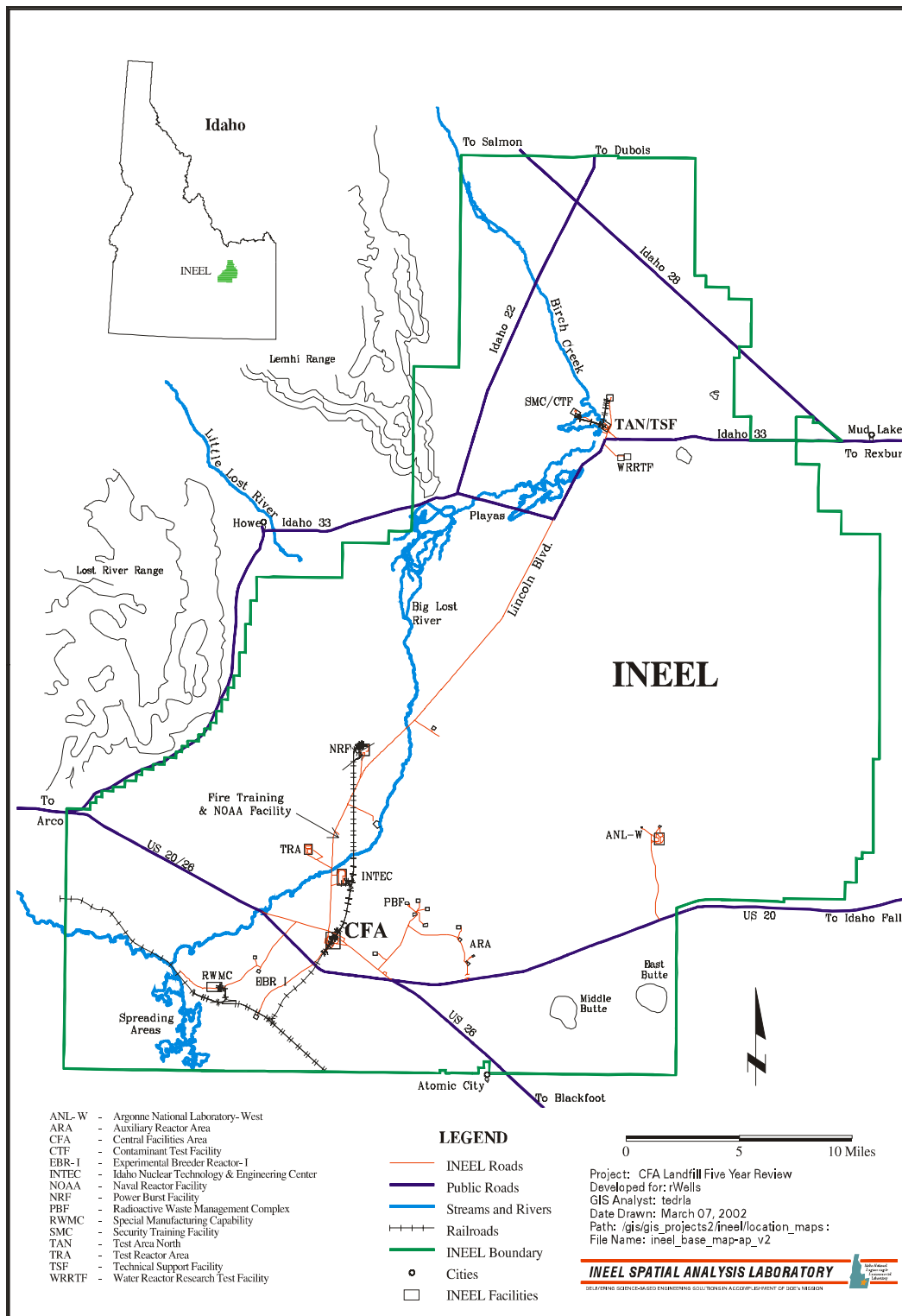


Figure 1. Idaho National Engineering and Environmental Laboratory.

1.3 Physical Site Description

The CFA-04 pond is a shallow, unlined surface depression that was originally a borrow pit for construction activities at CFA (Figure 2). It is approximately 152×46 m (500×150 ft) and roughly 2 to 2.4 m (7 to 8 ft) deep; basalt outcrops are present within and immediately adjacent to the pond. It received laboratory waste from the Chemical Engineering Laboratory (CEL) in Building CFA-674 between 1953 and 1969. The CEL was used to conduct calcine experiments on simulated nuclear waste. (The calcining process later was used on actual nuclear waste at the INEEL to change the waste from a liquid to a solid and to effect an overall volume reduction.) The CEL experiments used mercury to dissolve simulated aluminum fuel cladding as well as radioactive tracers in the calcining process. The primary waste streams discharged to the pond from the CEL included approximately 76.5 m^3 (100 yd^3) of mercury-contaminated calcine that contained low-level radioactive waste and liquid effluent from laboratory experiments. In addition, there is approximately 382 m^3 (500 yd^3) of rubble consisting of laboratory bottles, asphalt and asbestos-containing roofing materials, reinforced concrete, and construction and demolition debris. The pond also received run-off from the CFA site periodically between 1953 and 1995.

1.4 Remedial Action Objectives

The remedial action objectives (RAOs) for CFA-04 were developed in accordance with the 40 *Code of Federal Regulations* (CFR) 300, “National Oil and Hazardous Substances Pollution Contingency Plan,” and refined through discussions among the Agencies. The RAOs, as amended by the *Explanation of Significant Differences for the Record of Decision for the Central Facilities Area Operable Unit 4-13* (DOE-ID 2003c), are based on the results of human health and ecological risk assessments as outlined in the *Final Comprehensive Record of Decision for Central Facilities Area Operable Unit 4-13* (DOE-ID 2000b) (hereafter referred to as the Record of Decision or ROD). The intent of the RAOs is to set goals for the protection of human health and the environment. The following describes the RAOs for CFA-04 based on decisions in the Record of Decision (ROD) (DOE-ID 2000b).

The primary RAOs for this site were to:

- Prevent ingestion and inhalation of nonradionuclide contaminants of concern that would result in a total hazard index greater than 1.0
- Prevent exposure of ecological receptors to contaminated soil with concentrations that result in a hazard quotient greater than or equal to 10.

1.5 Selected Remedy

The Agencies have selected excavation, treatment by stabilization, and on-INEEL disposal for the CFA-04 pond mercury-contaminated soil based on consideration of requirements of CERCLA, the detailed analysis of alternatives, and public comments.

The selected remedy most cost-effectively meets the threshold and balancing criteria of the three alternatives considered. The removal of mercury-contaminated soil from CFA-04 will eliminate potential short-term and long-term human health and environmental threats. The INEEL CERCLA

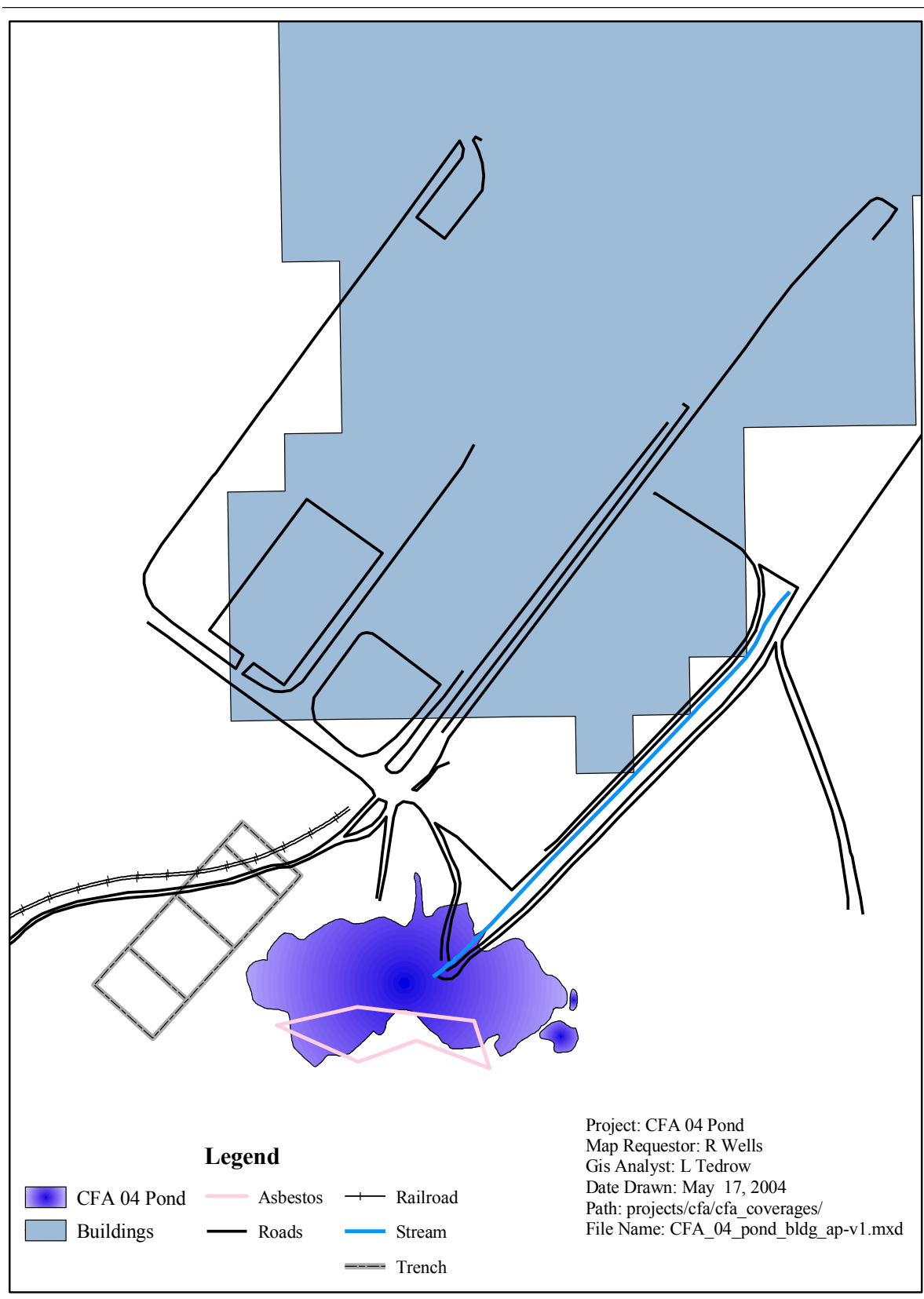


Figure 2. The Central Facilities Area (CFA)-04 Pond.

Disposal Facility (ICDF), or similar on-INEEL facility, will provide isolation of the contaminated soil and will prevent adverse effects to human health and the environment. The following actions will be performed at the site in support of implementing the remedial design:

1. Characterizing the site and excavating soil from CFA-04 that exceeds the mercury final remediation goal (FRG) of 8.4 mg/kg. Soil contaminated at concentrations above the FRG will be excavated to 10 ft (below ground surface) or to basalt. No basalt will be excavated.
2. Transporting and disposing of hazardous or radioactive soil that exceeds the mercury FRG to the ICDF. Transporting and disposing of nonhazardous and nonradioactive soil that exceeds the mercury FRG to the CFA landfills if the waste meets the facility's waste acceptance criteria per the *Idaho National Engineering and Environmental Laboratory Waste Acceptance Criteria* (DOE-ID 2004b).
3. Stabilizing soil with toxicity characteristic leaching procedure (TCLP) mercury concentrations greater than 0.2 mg/L at the ICDF's treatment facility using cement, verifying that all land disposal restrictions are met, and disposing of it at the ICDF.
4. Performing verification sampling to ensure that soil exceeding the FRG of 8.4 mg/kg total mercury has been removed.
5. Backfilling the excavated area with clean soil and smoothing the grade. All excavations will be contoured to blend with the surrounding terrain and will be revegetated to match the surrounding vegetation.

Performance standards will be implemented during the remedial design to ensure that excavation, treatment, and disposal activities will result in protection of personnel and the environment against direct exposure to mercury. The performance standards identified for this alternative include:

- Removing mercury-contaminated soil where concentrations exceeding the FRG of 8.4 mg/kg are identified.
- Using field screening measurements and soil sampling at the pond to verify that the remaining soil does not exceed the FRG.
- Sampling contaminated soil removed from the pond to confirm that the waste meets treatment standards for mercury and all underlying hazardous constituents, as identified in 40 CFR 268.48, "Universal Treatment Standards." In addition, verification must also ensure that the waste meets the approved disposal facility's waste acceptance criteria (DOE-ID 2004b). Soil meeting this standard must be less than 0.2 mg/L TCLP for mercury. Contaminated soil that does not meet treatment standards and requires treatment will be treated prior to disposal.

The following activities will be conducted to complete remediation of the CFA-04 pond:

- Removal of existing fencing (fabric, gates, and other reusable parts will be sent to excess)
- Removal of a temporary power pole and lines
- Excavation, stabilization (where required), packaging, transportation, and disposal of low-level mercury and TCLP mercury-contaminated soil in accordance with the INEEL Waste Acceptance

Criteria (DOE-ID 2004a) and the *Waste Acceptance Criteria for the ICDF Landfill* (DOE-ID 2004b)

- Excavation and disposal of asbestos-containing roofing material and other construction debris, including concrete, rebar, and gravel in accordance with the INEEL Waste Acceptance Criteria (DOE-ID 2004a) and the Waste Acceptance Criteria for the ICDF (DOE-ID 2004b)
- Backfilling and contouring of excavated areas to match surrounding terrain
- Revegetation of all areas affected by the project activities.

2. DISCUSSION OF REMEDIATION ACTIVITIES

2.1 Remedial Action Working Documents

The *Waste Area Group 4 Remedial Design/Remedial Action Work Plan, CFA-04 Pond Mercury-Contaminated Soils, Operable Unit 4-13* (DOE-ID 2003b)) (hereafter referred to as the Remedial Design/Remedial Action [RD/RA] Work Plan) lists the design criteria, describes the remedial design and how it was to be implemented for the remedial action, and serves as a guidance document for the CFA-04 remedial action. The following documents were included as appendices to the Remedial Design/Remedial Action Work Plan:

- Appendix A, “Design Drawings,” contains drawings that detail the present conditions (e.g., topography and fencing) at the site as well as work to be performed during the remedial action.
- Appendix B, “Construction Specifications,” contains technical specifications that provide the general terms and conditions required for completing the remedial action.
- Appendix C, “Air Emissions Calculations” (Engineering Design File [EDF] -2442, “Exposure and Dose Calculations for Excavation of Mercury- and Radionuclide-Contaminated Soils at the CFA-04 Mercury Disposal Pond”), presents a summary from results of the air emissions calculations to satisfy the project’s applicable or relevant and appropriate requirements (ARARs).
- Appendix D, “Pre-Remediation Sampling Summary Report,” presents the results of the preremediation sampling conducted before the remedial action to better define the areal and vertical extent of contamination at the CFA-04 pond site. The soil excavation design is based on the results presented in this summary report.
- Appendix E, “Waste Management Plan,” describes the management and disposal of waste generated during remedial activities.
- Appendix F, “Cost Estimate for the CFA-04 Remedial Design/Remedial Action Work Plan,” provides the cost estimate, basis for the estimate, and related assumptions.
- Appendix G, “Environmental Checklist,” contains the environmental checklist.
- Appendix H, “Asbestos Sampling Data and Friability Determination,” contains asbestos sampling data and friability determination.

- Appendix I, “Archeological and Historic Property Clearance,” contains the archaeological clearance recommendation.
- Appendix J, “Ordnance Survey Clearance,” contains the ordnance survey clearance.
- Appendix K, “Safety Category List and Safety Category Designation and Record,” contains the safety category list and the safety category designation and record.

In addition, a separate document was prepared for CFA-04 pond soil removal. The *Health and Safety Plan for the Central Facilities Area-04 Mercury Pond Sampling and Remedial Action* (Roberts 2003) specifically describes the possible hazards and required actions to protect the health and safety of workers.

2.2 Site Preparation and Mobilization

The following activities were performed in order to prepare the site and mobilize for excavation of mercury-contaminated soils at the CFA-04 pond:

- Assembled the project work team and conducted a prejob briefing on work task assignments in accordance with Revision 1 of the *Health and Safety Plan for the Central Facilities Area-04 Mercury Pond Sampling and Remedial Action* (Roberts 2003) (HASP) and Management Control Procedure (MCP)-3003, “Performing Pre-Job Briefings and Documenting Feedback.” Specific elements of the prejob briefing included identification of work to be performed and communication of the hazards and mitigation to enable safe completion of the work.
- Delivered and stored equipment and materials to the jobsite.
- Inspected heavy equipment before it was used onsite.
- Identified and demarcated work areas, including installation of work zone fencing, signs, and postings.

The following subsections discuss how the remedial action complied with INEEL work control, training, and other regulatory requirements.

2.2.1 Personnel Training Requirements

Before the start of fieldwork, all workers were required to have the following training, as specified in Section 4 (Revision 1) of the *Health and Safety Plan for the Central Facilities Area-04 Mercury Pond Sampling and Remedial Action* (Roberts 2003):

- Site-specific training, as required by the Health and Safety Plan (HASP) (Roberts 2003)
- Project-specific training
- 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) (MCP-2748)
- Hazardous Waste Operations 24-hour “on-the-job” training, as necessary
- 8-hour HAZWOPER site supervisor, as necessary (MCP-2748)
- Biohazard training

- Hearing conservation
- Hazardous material (HAZMAT) employee general awareness training
- CPR and medic first aid, as necessary.

Certifications of training and training updates were maintained in the training database on the INEEL Intranet and in subcontractor files.

2.2.2 Staging and Storage of Equipment and Supplies

A staging area was established west of the CFA-04 pond area to store and operate project-related equipment and materials close to the work without having personnel enter a mercury-contaminated area. The staging area served as a command post from which personnel conducted remedial operations, performed prejob briefings, documented activities, and performed other functions necessary to implement the *Waste Area Group 4 Remedial Design/Remedial Action Work Plan, CFA-04 Pond Mercury-Contaminated Soils, Operable Unit 4-13* (DOE-ID 2003b). A control point restricting entrance and egress between the decontamination area and the staging area was established. All staging activities, and storage of equipment and material, were done in accordance with the HASP (Roberts 2003).

2.2.3 Regulatory Compliance

The OU 4-13 CFA-04 pond remedial action complied with all applicable or relevant and appropriate requirements (ARARs), as outlined in Section 4.2 of the RD/RA Work Plan (DOE-ID 2003b).

2.2.4 Idaho National Engineering and Environmental Laboratory Work Control Requirements

To comply with INEEL procedures and requirements for conducting fieldwork, the following items were completed before starting the remedial action:

- Standard 101, Chapter Six, “Project Work Order” work package
- Project listed on CFA work-planning schedules
- Formal prejob briefing
- Subsurface investigation
- National Environmental Policy Act documentation and Environmental Checklist (included in the RD/RA Work Plan [DOE-ID 2003b])
- Storm Water Pollution Prevention Plan^a
- Spill prevention and control measures
- Cultural Resources and Historical Property Survey (included in the RD/RA Work Plan [DOE-ID 2003b])
- Ordnance survey.

a. DOE-ID 1993, *INEL Storm Water Pollution Prevention Plan for Industrial Activities* (Draft), DOE/ID-10431, Rev. 0 (Draft), 1993.

Before the start of each day's work, a plan-of-the-day meeting was held to review the day's work activities and to discuss any new issues that might have been created by the previous day's work activities.

2.3 Remedial Action

The remedial action work at the CFA-04 pond mercury-contaminated soils consisted of removing mercury-contaminated soils for delivery to the ICDF for direct disposal and treatment. The soils were excavated and placed per the design requirement in the RD/RA Work Plan (DOE-ID 2003b). Additional detail is provided in the following section for the remedial activities that occurred at the CFA-04 pond mercury-contaminated soils. Deviations from the original RD/RA Work Plan are noted, and a detailed discussion of these deviations is presented in Section 4 of this report. The details of the remedial action field activities are contained in the INEEL Subcontractor Technical Representative's logbook, which is located in the project files.

2.3.1 Site Preparation

A plot plan delineating the project boundary areas was prepared before field activities commenced. The areas directly associated with soils removal required the subcontractor to perform land surveys of each area that required remediation as shown in Figure 3. The following general site-preparation activities were accomplished before the subcontractor began to remove mercury-contaminated soil. Special requirements are stated as noted on the design drawings. The specific work task elements necessary to complete this work are identified in Section 5.3 of the RD/RA Work Plan (DOE-ID 2003b).

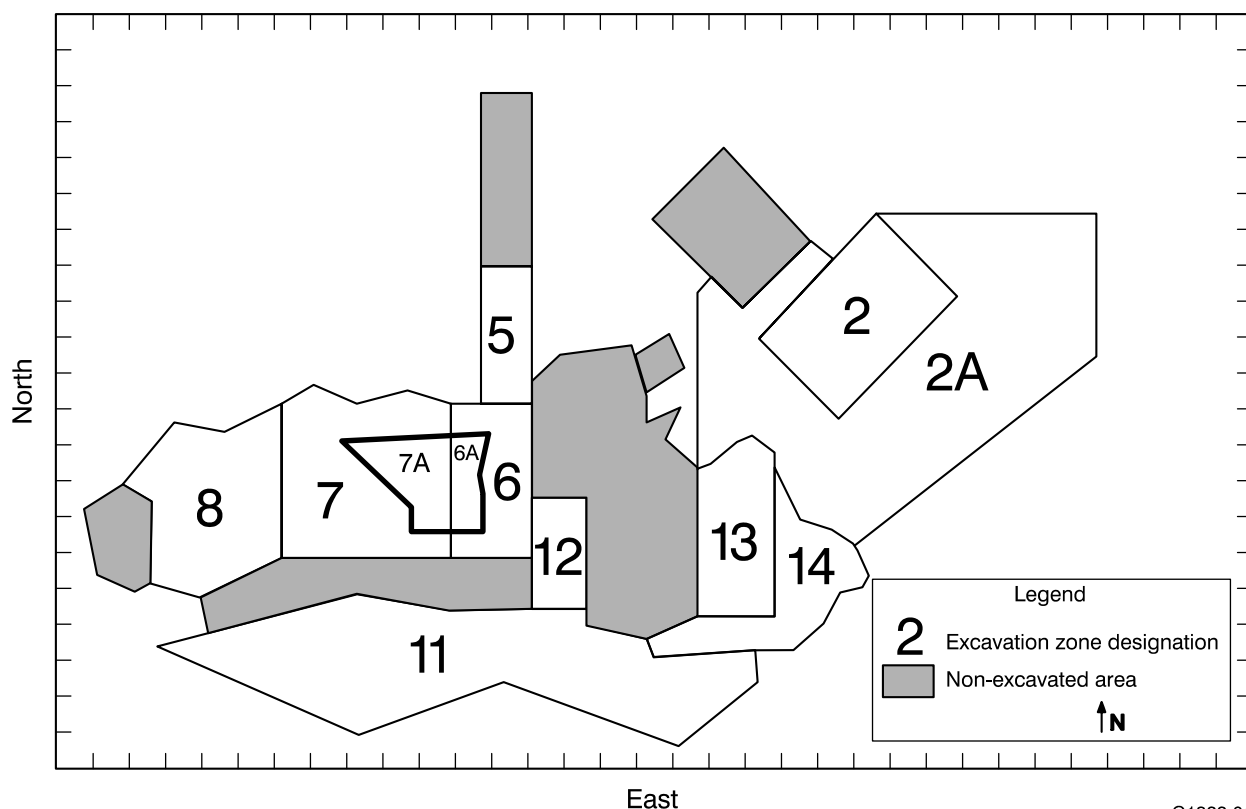
2.3.2 Remediation Activities

Before commencing work, the subcontractor provided the contractor with all required submittals, work plans, bonds, and insurance. The subcontractor verified that all remedial activity personnel working under contract for the subcontractor were familiar with the relevant provisions of the project HASP (Roberts 2003). The subcontractor provided the contractor with documentation confirming that all project personnel working for or through the subcontractor had received the necessary training and completed the medical examination requirements. The subcontractor submitted a work plan through the vendor data system. The project team approved this work plan before the subcontractor commenced fieldwork.

A biological and cultural survey of the Pond area was performed before start of construction activities, and in accordance with the Environmental Checklist provided in Appendix G of the *Waste Area Group 4 Remedial Design/Remedial Action Work Plan, CFA-04 Pond Mercury-Contaminated Soils, Operable Unit 4-13* (DOE-ID 003b). During construction activities, no other surveys were performed.

Prior to the subcontractor mobilizing, the BBWI "Paper, Allied-Industrial, Chemical and Energy Workers (Local 8-0652)" (PACE) crew removed soils in the CFA-04 pond that were contaminated with asbestos. These materials were primarily soils and roofing shingles. The roofing shingles contained no friable asbestos. The BBWI PACE crew completed the removal of the asbestos-containing material (ACM) in July of 2003. Approximately 7,989 yd³ of debris/soils were delivered to the CFA Bulky Waste Landfill.

The subcontractor mobilized to the site on September 8, 2003. Once the subcontractor mobilized, craft personnel were trained on the HASP (Roberts 2003) and project-specific work control documentation. The subcontractor began removing soil from areas that required treatment on September 15, 2003. These soils were delivered to the storage pad at the ICDF. The subcontractor completed delivery of soils requiring treatment on September 29, 2003. The last load of soil from the



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Figure 3. Central Facilities Area, CFA-04 remedial action excavation zones.

CFA-04 pond was placed in Cell 1 of ICDF on October 29, 2003. The fence fabric was removed and set aside for reuse. The fence posts and associated concrete were delivered to the CFA Bulky Waste Landfill for disposal. All debris was delivered to the CFA Bulky Waste Landfill for disposal.

Dust suppression was required while heavy equipment was in operation. Subcontractor water trucks were used to apply water from outside the excavation area. Water for dust suppression was retrieved from the CFA Fill Station.

Confirmation sampling was performed at the CFA-04 pond to ensure cleanup goals were achieved. All sampling was performed prior to backfilling the CFA-04 pond. Based on field sampling and quality control sampling results, the average mercury contamination remaining at the CFA-04 pond is 2.14 mg/kg, which is less than the FRG of 8.4 mg/kg. See Appendix C for confirmation sampling results. Additionally, an assessment of the concentrations of mercury remaining on basalt was performed to determine if institutional controls were required at the CFA-04 pond. Based on the results of the assessment, no institutional controls will be required at CFA-04 pond. See Appendix C for sampling results and Appendix F for results of assessment of on-basalt remedial action sampling.

2.3.2.1 Preremediation Sampling. The volume of contaminated soil requiring excavation has been reevaluated due to results of the preremediation sampling conducted during the summers of 2002 and 2003. Based on results of the historical sampling (DOE-ID 2000b) and the preremediation sampling conducted in 2002 and 2003 (Appendixes C and D, respectively), the volume of mercury-contaminated soil above the FRG was estimated at 8,101 m³ (10,597 yd³), including 1,725 m³ (2,256 yd³) of asbestos-containing material and commingled mercury-contaminated soil, 515 m³ (674 yd³) of potentially characteristic RCRA-regulated waste, and 119 m³ (156 yd³) of potentially contaminated soil and rubble in

stockpiles. This is more soil than was estimated to be excavated in the ROD—6,338 m³ (8,290 yd³). Preremediation sampling results presented in Appendix C indicate that the soil around the asbestos-containing material is contaminated with mercury, whereas the asbestos-containing material was determined to be uncontaminated. The initial boundaries of the excavation, as determined based on the 2002 and 2003 preremediation sampling, are shown in Figure 3.

2.3.2.2 Asbestos-Containing Material Removal. The asbestos-containing material located along the southern portion of the pond and along the south pond berm (Zone 11) encompassed an area of approximately 1,834 m² (19,740 ft²). The estimated volume of material disposed (i.e., asbestos-containing material and commingled soil) was 2,044 m³ (2,673 yd³). Based on results of the preremediation sampling, the commingled soil is contaminated with mercury at concentrations in excess of the FRG to a depth of 1 m (3 ft), as presented in Appendix D. As such, the initial removal of soil in this area was to a depth of 1 m (3 ft), followed by visual inspections for additional asbestos-containing material. Additional asbestos-containing material was identified at various locations throughout Zone 11, and excavation continued until visual inspections verified that no asbestos-containing material remained in the area.

Asbestos-containing material and commingled soil removed from the site were determined to contain low levels of mercury (see Appendix C); however, incidental calcine will not be significant enough to classify the asbestos-containing material as a hazardous waste (TCLP greater than 0.2 mg/L), as indicated by an assessment performed in 1994 to evaluate the potential for mercury-contaminated, asbestos-containing material to be classified as hazardous waste. Three samples of asbestos-containing material were collected and analyzed for TCLP mercury, with all results being non-detect (INEEL 1998). Also, none of the preremediation samples from 2002 exceeded the TCLP for mercury (see Appendix C). As such, the asbestos-containing material is not considered RCRA-characteristic hazardous waste. Radiological surveys of the excavated asbestos-containing material will be conducted to verify the absence of radioactive material.

2.3.2.3 Mercury-Contaminated Soil Excavation. Excavation of mercury-contaminated soil above the 8.4-mg/kg FRG was completed in accordance with the design drawings and specifications provided in the CFA-04 RD/RA Work Plan (DOE/ID 2003b).

Based on historical and preremediation sampling events, and for the purposes of waste disposition, four categories of mercury-contaminated soil were excavated. The four categories were as follows:

1. Low-Level Mercury-Contaminated Soil—Soil was detected with total mercury concentrations above 8.4 mg/kg and TCLP mercury concentrations less than 0.2 mg/L, and radionuclide concentrations exceeding the INEEL Waste Acceptance Criteria (DOE-ID 2004a). Radioactive tracers (Cs-137, Sr-90, Ru-106, and unidentified uranium isotopes) were used in the calcine tests (INEEL 1998); therefore, the excavated soil may be considered low-level radioactive in addition to its mercury component (approximately 3,091 m³ [4,043 yd³] from Zones 5, 6, 7, and 8).
2. Mercury-Contaminated Soil—Soil was detected with total mercury concentrations above 8.4 mg/kg and TCLP mercury concentrations less than 0.2 mg/L (approximately 4,495 m³ [5,880 yd³]). This includes the mercury-contaminated asbestos-containing material from Zone 11 and mercury-contaminated soil from Zones 2, 2A, 12, 13, and 14.
3. Low-Level, TCLP Mercury-Contaminated Soil—Soil with total mercury concentrations between 8.4 and 260 mg/kg (8.4 mg/kg ≤ soil concentration < 260 mg/kg), TCLP concentrations greater than or equal to 0.2 mg/L, and radionuclide concentrations exceeding the INEEL Waste Acceptance Criteria (DOE-ID 2004a) (approximately 515 m³ [674 yd³] from Zones 6A and 7A) of mercury-contaminated soil were included in this waste stream because of its potential to exceed the

TCLP based on 1994 sampling; however, the soil did not exceed the TCLP in preremediation sampling.

4. **TCLP Mercury-Contaminated Calcine**—Calcine beads with total mercury concentrations greater than 260 mg/kg and TCLP concentrations greater than or equal to 0.2 mg/L (quantity unknown).

Where contaminated soil extended to the soil/basalt interface, the contaminated soil was removed, to the extent practical, from the basalt interface and in the basalt cracks/crevices using methods that included heavy equipment and hand-digging.

2.3.2.4 Soil Hauling and Disposal. All excavated materials, including the asbestos-containing material and mercury-contaminated soil, were loaded into end-dump trucks or similarly approved equipment. The beds of the end-dumps were lined with plastic bags (burrito bags) prior to loading and hauling the low-level TCLP material. After placement of the soil in the truck beds, the burrito bags were folded over the top of the load and sealed for transport to the ICDF.

2.4 Occupational Health and Safety

The following sections discuss personnel monitoring conducted on the OU 4-13 remedial action.

2.4.1 Industrial Hygiene Summary

2.4.1.1 Noise Surveillance. The potential existed for exposing personnel who either operated or worked near heavy equipment to noise levels exceeding 85 decibels. Whenever noise levels exceed an 8-hour, time-weighted average of 85 decibels, implementation of a continuing, effective hearing conservation program is required by 29 CFR 1910.95, "Occupational Noise Exposure." Routine noise assessments, conducted by the project industrial hygienist, demonstrated a need for the program, which included the use of hearing protection. Employees at the task site wore acceptable hearing protection, as required.

2.4.1.2 Heat and Cold Stress Surveillance. The majority of fieldwork took place in the cooler fall months. The HASP (Roberts 2003) identified the need to ensure that employees did not experience undue heat or cold stress. The health and safety officer and industrial hygienist conducted periodic surveillances of personnel. Work/rest regimens were implemented as conditions dictated. Personnel were trained in identifying the symptoms of heat and cold stress and in how to handle a potential victim. Cool, potable drinking water was available at the task site to keep personnel hydrated, and a trailer was provided to allow personnel to take breaks.

2.4.1.3 Radiological Surveillance. Radiological contamination was not present at this site above natural background. Radiological contamination was also not a contaminant of concern. Radiological control technicians performed intermittent surveys to ensure personnel safety.

2.5 Decontamination

Decontamination for mercury contamination was performed. Personnel sprayed heavy equipment with water, and personnel stayed out of the area that was sprayed. Personnel in the areas that had mercury contamination above the FRG of 8 mg/Kg used dry methods of decon prior to leaving the area.

2.6 Site Restoration

The subcontractor delivered soil from the pit north of the CFA Bulky Waste Landfill to backfill the area of excavation. The area was contoured to the surrounding area and reseeded according to specifications.

2.7 Demobilization

Final demobilization of the subcontractor was completed on November 26, 2003. See Appendix G for the final topographic survey of CFA-04.

3. COSTS

Total project costs for the CFA-04 remedial action activities are provided in Table 1. These costs include INEEL project management, materials, and labor costs associated with remediation of the site.

The estimated long-term costs for caretaker, maintenance, surveillance and monitoring, and program management as presented in the ROD (DOE-ID 2000b) are still applicable. These costs were not reestimated as part of this remedial action.

Table 1. Remedial action costs for Central Facilities Area CFA-04.

Activity	ROD Cost Element, \$K ^a	Updated Cost Element, \$K
RD/RA document preparation	356.5	
Prefinal Inspection and Remedial Action Report	55.5	^a
Site characterization	1,394.0	^a
<u>Remedial Action:</u>	<u>1,245.0</u>	<u>404.0 (FY-04 only)^a</u>
<u>Total</u>	<u>3,051.0</u>	

a. Cost estimates from the ROD include a 30% contingency and a factor of 1.0727 to convert from FY 1999 to FY 2001 dollars.

CFA = Central Facilities Area

RD/RA = remedial design/remedial action.

ROD = Record of Decision.

4. MODIFICATIONS TO THE REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN

Several modifications to the RD/RA Work Plan (DOE-ID 2003b) were required during the course of the project. A brief description of each modification is listed below:

- The subcontractor exposed additional asbestos-containing material that required excavation and delivery to the CFA Bulky Waste Landfill.
- The subcontractor exposed the bituminous clay piping. This piping was found to contain mercury contamination above the FRG of 8.4 mg/kg. This piping was sampled in the pipe and under the pipe. The sample in the piping read 45 mg/kg mercury, and the sample collected under the piping read 65 mg/kg. The Agencies agreed to list the pipe as a new site under OU 10-08.
- Removal of the dirt on the basalt was performed to the extent practicable with excavation equipment. Brooms, etc., were not used to clean the dirt off the basalt.

5. QUANTITIES AND TYPES OF WASTE GENERATED

Waste generated during remedial activities was managed in accordance with the requirements delineated in Appendix F of the WAG 4 RD/RA Work Plan (DOE-ID 2001). The INEEL Waste Generator Services was responsible for managing all waste in accordance with INEEL procedures.

5.1 Waste Minimization and Segregation

Waste minimization was achieved through design and planning to maintain efficient operations. To achieve this goal, waste streams were segregated by the field activity being conducted at the time of generation. Waste types generated included nonconditional industrial waste, conditional industrial waste, and nonhazardous waste. Waste containers were provided for each specific waste stream and were maintained inside the work area until removed for either storage or disposal.

5.2 Packaging and Labeling

Waste was packaged in accordance with criteria set forth in the INEEL Waste Acceptance Criteria (DOE-ID 2004a). The types of containers used included a dump truck and roll-on/roll-off containers for bulk waste destined for disposal at the CFA landfill.

All containers were labeled in accordance with INEEL procedures and all applicable state, federal, and local regulations.

5.3 Waste Types

Various waste types were generated including debris (e.g., galvanized fence piping, and wood). Hazardous waste determinations were completed before any waste was sent to the CFA Bulky Waste Landfill. Table 2 summarizes the waste that was generated during remediation activities.

Table 2. Waste Area Group 4 Central Facilities Area-04 Mercury Pond waste summary.

Waste Stream	Volume	Disposal Site	Status
Asbestos-contaminated soils	8,145 yd ³	CFA Landfill	Disposed
Mercury-contaminated soils for treatment	900 yd ³	ICDF	Awaiting treatment
Mercury-contaminated soils for direct disposal	7,508 yd ³	ICDF	Disposed
Wood debris, including telephone poles	50 ft	CFA Landfill	Disposed
Galvanized fence/fence posts	2,650 linear ft	Stored for recycling	N/A

N/A = not applicable.

ICDF = INEEL CERCLA Disposal Facility

6. PREFINAL AND FINAL INSPECTION

The contractor conducted the prefinal inspection of CFA-04 on October 16, 2003, as indicated by the prefinal inspection checklist in Appendix B. The Agencies were informed of the prefinal inspection results by e-mail. Incomplete items at the time of the prefinal inspection are as follows:

- Off-site laboratory analytical data received, validated, and entered into the Environmental Restoration Information System (ERIS)
- Validated analytical data transmitted to the Agencies (DOE Idaho, DEQ, and the EPA)
- Excavation and backfill completed
- Reclamation seeding with wood chip mulch performed in all disturbed areas
- Certified seed mix used in seeding
- Soil analyzed to determine appropriate fertilizer mix and applicable fertilizer applied
- Demobilization of equipment, postings, and rope
- Topographical survey completed
- As-built drawings depicting final construction completed.

Items were completed, and a final inspection was performed on January 5, 2004.

7. SUMMARY AND VERIFICATION OF WORK PERFORMED

The primary work activities for the remedial action included:

- Removing existing fencing, telephone poles, and wood debris.
- Excavating, hauling, and placing earthen materials at the CFA Bulky Waste Landfill and ICDF per the design drawing and specification.
- Reseeding the cover vegetation and revegetating all areas affected by project activities.

7.1 Summary of Work Performed

The remedial action has been completed in accordance with the RD/RA Work Plan (DOE-ID 2003b). The remedial action included the following:

- The subcontractor established a control point for survey purposes.
- The removal of mercury-contaminated soils and delivery of these soils to the ICDF and CFA Bulky Waste Landfill.
- Telephone pole and wooden debris were removed and delivered to CFA landfill or stored for reuse (fence and gates).

Verification of work performed was documented throughout the duration of the project. The contractor representative maintained a daily logbook and a site attendance logbook that detailed each day's work activities, numbers of personnel, names of personnel on the job site, and their functions. Periodic management assessments were conducted during the remedial action to verify that work was being completed on schedule and in accordance with the RD/RA Work Plan (DOE-ID 2003b).

A prefinal inspection of the site was conducted on October 16, 2003, to verify that the work outlined in the WAG 4 RD/RA Work Plan (DOE-ID 2003b) was accomplished. Results of this inspection are documented in the Prefinal Inspection Report presented in Appendix B.

7.2 Performance Standards

The remedial action was performed as planned. See Appendix G for final topographical surveys. Vendor data included the subcontractor's topographical surveys of the remediation area and redline construction drawings.

Performance standards in the ROD (DOE-ID 2000b) include design requirements for the remediation and are satisfied in the removal of soils from CFA-04, as indicated in Table 3.

Table 3. Implementation of performance standards.

Performance Standard	Requirement Met
Removing mercury-contaminated soil where concentrations exceeding the FRG (8.4 mg/kg) are identified.	Soils were removed; see photographic record, Appendix B, Prefinal Inspection Report.
Using field screening measurements and soil sampling at the pond to verify that the remaining soil does not exceed the FRG.	See sampling results in Appendix C, CFA-04 Mercury Pond RA Sampling Results.
Sampling contaminated soil removed from the pond to confirm that the waste meets treatment standards for mercury and all underlying hazardous constituents as identified in 40 CFR 268.48. ^a In addition, it must also be verified that the waste meets the approved disposal facility's waste acceptance criteria. ^b Soil meeting this standard must be less than 0.2 mg/L TCLP for mercury. Contaminated soil that does not meet treatment standards and requires that treatment will be treated prior to disposal.	See sampling results in Appendix C, CFA-04 Mercury Pond RA Sampling Results. See photographic record of soil placement at the ICDF treatment storage pad in Appendix B.
<p>a. 40 CFR 268.48, 2003, "Universal Treatment Standards," <i>Code of Federal Regulations</i>, Office of the Federal Register, January 2003.</p> <p>b. DOE-ID, 2004, <i>Waste Acceptance Criteria for the ICDF Landfill</i>, DOE/ID-10865, Rev. 6, April 2004.</p> <p>CFA = Central Facilities Area</p> <p>CFR = Code of Federal Regulations</p> <p>FRG = final remediation goal</p> <p>ICDF = INEEL CERCLA Disposal Facility</p> <p>RA = remedial action</p> <p>TCLP = toxicity characteristic leaching procedure</p>	

8. CERTIFICATION THAT REMEDY IS OPERATIONAL AND FUNCTIONAL

As stated in the ROD (DOE-ID 2000b), the RAOs and the remedial action goals were established to reduce or eliminate the risk to human health and the environment.

This report certifies that the remedies selected in the ROD (DOE-ID 2000b) and detailed in the RD/RA Work Plan (DOE-ID 2003b) have been completed and are operational and functional.

9. REFERENCES

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40 CFR 268.48, 2003, "Universal Treatment Standards," *Code of Federal Regulations*, Office of the Federal Register, January 2003.

40 CFR 300, 2004, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, Office of the Federal Register, January 2004.

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DOE-ID, 2003a, *Construction Complete Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, CFA-08 Sewage Plant Drainfield*, DOE/ID-11059, Rev. 0, June 2003.

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DOE-ID, 2004a, *Idaho National Engineering and Environmental Laboratory Waste Acceptance Criteria*, DOE/ID-10381, Rev. 19, April 2004.

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Appendix A

Compilation of Remedial Action Information

Attachment A1. Construction Complete Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, Transformer Yard (CFA-10) (DOE/ID-10965, Rev. 0).....	Att-A1-1
Attachment A2. Construction Complete Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, CFA-08 Sewage Plant Drainfield (DOE/ID-11059, Rev. 0)	Att-A2-1

Attachment A1

Construction Complete Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, Transformer Yard (CFA-10) (DOE/ID-10965, Rev. 0)

TO VIEW ATTACHMENT A1 SEE:

DOE/ID-10965, REV.00

Attachment A2

Construction Complete Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, CFA-08 Sewage Plant Drainfield (DOE/ID-11059, Rev. 0)

TO VIEW ATTACHMENT A2 SEE:

DOE/ID-11059, REV.00